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ABSTRACT

In 1980, a study was conducted to evaluate the cognitive development of community college graduates. Data were drawn from the National Longitudinal Study of the High School Class of 1972. The control variables used in the analysis were three socioeconomic variables and scores on two standardized tests of verbal and mathematical achievement. The independent variable was level of education (i.e., high school, two-year college, or four-year college) and the outcome measures were scores on verbal and mathematics tests administered in 1979. Separate analyses were performed for blacks (N=327) and whites (N=1273). The study revealed that: (1) for white students, verbal and mathematics achievement was higher among those who received postsecondary education than those who terminated their education after high school; (2) both black and white students who went on to postsecondary institutions received higher scores on the verbal test in 1979 than in 1972, though during this period their mathematics scores declined; (3) the greatest relative improvement in verbal skills among blacks came from those who had graduated from four-year colleges; and (4) blacks from two-year colleges did not perform better on the 1979 verbal test than blacks with a high school education. A major study conclusion was that two-year colleges contribute to students' cognitive development, but that benefits to black students are less evident than benefits to white students. (HB)

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THE COGNITIVE VALUE OF TWO-YEAR COLLEGES FOR WHITES AND BLACKS

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THE COGNITIVE VALUE OF TWO-YEAR COLLEGES FOR WHITES AND BLACKS

ABSTRACT

Although community college educators believe their programs benefit their students through cognitive development, until now no good evidence was available. The fourth follow-up of the National Longitudinal Study of the High School Class of 1972 allows the controlled assessment of the value of two-year institutions. The results indicate that while whites benefit cognitively from two-year post-secondary programs, blacks do not.

THE COGNITIVE VALUE OF TWO-YEAR COLLEGES FOR WHITES AND BLACKS

In 1947, the President's Commission on Higher Education (1947, p.9) concluded that, "The first goal in education for democracy is the full, rounded and continuing development of the person....To liberate and perfect the intrinsic powers of every citizen is the central purpose of democracy, and its furtherance of individual self-realization is its greatest glory." From these principles the specific goals of higher education are derived (Bowen, 1977). The formal academic program and extra-curricular life of an academic community are intended to help students develop in three respects: cognitive learning, affective development, and practical competence (Bowen, 1977). It is assumed that as these goals are realized so are the powers of the individual.

Whenever there are goals to be reached in any endeavor, it is natural to ask whether they are in fact being realized. Bowen (1977) compares education to an industry that is responsible for disclosing both its costs and outcomes. Assessing the outcomes of higher education is necessarily a complex task; nevertheless attempts have been made to pull together information from a variety of studies and draw conclusions from them (e.g., Feldman and Newcomb, 1969; Bowen, 1977; Pace, 1979). In general the effects of college attendance have been found to be positive. Attending college raises the level of knowledge and cognitive powers of students, increases psychological well-being, understanding, tolerance

and self-reliance, and helps students develop skills and traits that make them more adaptable to a variety of social and work situations (Bowen, 1977).

Comprehensive evaluations of higher education have been limited to four-year colleges. For example, Karweit and McPartland (1981) studied the cognitive gains produced by post-secondary schooling, and found that college attendance enhanced vocabulary skills, but only maintained mathematic skills. In contrast, little has been done to evaluate outcomes of community college attendance, although educators within community college systems stress the importance of accountability in establishing the much maligned credibility of community colleges (Roueche and La Forge, 1974; Miller, 1979).

The absence of research on community colleges is in part due to the variety of functions that community colleges have assumed. Community colleges were originally intended to open the doors of education to all high school graduates, especially the economically disadvantaged (Monroe, 1972). Emphasis was placed on providing two-years of additional general education beyond high school, and on low-cost preparation for students who wished to transfer to four-year colleges in the third year. In 1947 the President's Commission on Higher Education (1947) suggested that the emphasis of two-year colleges should be shifted to preparation for semi-professional white collar and vocational occupations. This preparation was not to be at the expense of general education, but in addition to it, for those who desired to learn specific occupational skills. As the popularity of community colleges grew, it

also became apparent that many economically disadvantaged students were also academically disadvantaged, and community colleges found themselves in the business of providing remedial courses for many students who were not ready to enter regular academic programs.

Although research indicates that community colleges in general place greater emphasis on occupational education than when originally conceived, they remain, at least in philosophy, committed to providing an education that contributes to the intellectual development of their students, whether they are in academic or vocational programs (Monroe, 1972; Cross, 1974). This commitment is in recognition of the fact that cognitive skills such as verbal ability and basic mathematics competence, and affective development in the areas of self-awareness and interpersonal relations, are necessary to practical competence in most work and social situations.

Community college curricula, in general, reflect a commitment to intellectual and affective development. The general education requirement in community colleges varies greatly, but usually consists of a specified number of elective courses to be chosen from the humanities, natural sciences, mathematics, and the social sciences (Monroe, 1972). Remedial programs are primarily for academic deficiences in reading, language, and mathematics (Monroe, 1972).

Although community college programs seem designed to further cognitive and affective development, critics (Scigliano, 1976; Hudson and Smith, 1976) question the ability of community colleges to provide a good general education. Nevertheless, there is little evidence on this point

one way or the other. Existing studies are lacking in several ways. For example, Roueche and Kirk (1973) and Lavin et al. (1979) determined the success of programs for academically and economically disadvantaged students in community college programs by looking at grade point averages and completion rates; however, neither of these measures establish gains in cognitive or affective development. Rossmann et al. (1975) measured cognitive development by gain scores on reading and mathematics tests, but they were unable to compare gains against a control group of noncollege attenders.

STATEMENT OF PROBLEM.

The purpose of this study was to evaluate the cognitive development of students who have graduated from community colleges. We were specifically interested in verbal and quantitative skills. These skills are especially significant not only because they are valuable in their own right, but because they facilitate all kinds of learning throughout life (Duncan, 1968).

In 1980, data became available to assess the cognitive value of two-year colleges in the areas of verbal and mathematical achievement for a representative sample of U.S. youth, and to compare gains of two-year college graduates to gains of samples of noncollege attenders and four-year college graduates. The fourth follow-up survey of the National Longitudinal Study of the High School Class of 1972 includes a readministration in the home of the tests of verbal aptitude and basic mathematical competence first administered to the students before they graduated from high school. Using these data, this research assessed the

1979 test performance in both math and verbal abilities for a sample of youths who (1) received certificates or licenses for completion of noncollege related vocational programs, (2) who graduated from two-year college vocational programs, (3) who graduated from two-year college general education programs, and (4) who graduated from four-year college programs. The test performances of these groups were compared to the 1979 test performance of a sample of their 1972 high school senior peers who terminated their educations at the end of high school. As one would expect, some of these groups differed in socioeconomic background and ability at the time of high school completion; therefore, these variables were controlled in this research so that results reflect the net effect of post-secondary schooling on cognitive ability. Separate analyses were performed for whites and blacks.

THE DATA.

Data for this study were drawn from the National Longitudinal Study (NLS) of the High School Class of 1972 (see Riccobono et al., 1981). The NLS was designed to provide data on a large cohort of high school seniors, and to follow these students as they made the move from high school into their early years of adulthood. The control variables used in the analyses were three socioeconomic background variables, composite measures of father's education, of mother's education, and of father's occupation, and scores on two standardized tests of verbal and mathematics achievement administered to respondents in 1972, prior to graduation from high school. The independent variable was type of education, defined as either: (1) high school only, (2) completed

requirements for a noncollege related vocational certificate or license, (3) completed a two-year vocational program, (4) completed a two-year academic program, or (5) completed a four-year academic program. The outcome measures were scores on the home readministration in 1979 of the two standardized tests of verbal and mathematics achievement.

The verbal and mathematics tests were constructed by the Educational Testing Service to assess basic competence, not necessarily knowledge gained in specific curricula. The verbal test consisted of 15 items; the mathematics test consisted of 25 items. All test scores were corrected for guessing. Complete data were available on 1273 whites and 327 blacks.

METHOD AND RESULTS.

A basic assumption of the analysis of covariance is that the regression slopes between the dependent variable and the covariates are the same for the several groups. This is equivalent to saying that the addition of interaction terms between the covariates and a set of dummy variables measuring types of post-secondary education did not add significantly to the explanation of 1979 test performance. Such tests were performed, and the results (not shown here) led us to conclude that the slopes between the dependent variable and covariates were the same for all five education groups. In every case, the addition of the interaction terms increased the coefficients of determination by less than one percent.

Analyses of covariance were then performed, separately for verbal and mathematics tests, separately for whites and blacks, to obtain group

means adjusted for differences in socioeconomic background and level of competence in 1972. Adjusted means for groups with some education beyond high school were then compared to the adjusted mean for the group with no education beyond high school. Because the number of blacks receiving two-year college vocational and academic degrees was so small, these two groups were combined in both the regression analyses and the analyses of covariance.

Means and standard deviations for the 1972 and 1979 test performances, and the adjusted means for the 1979 test performance are shown in Table 1 (whites) and Table 2 (blacks).

Whites.

Our expectation was that students who received any kind of post-secondary education would receive cognitive benefits therefrom. The results shown in Table 1 confirm our expectations for whites. In every instance, the mean level of both verbal and mathematics achievement for those students who went on to receive post-secondary educations were significantly different from the mean achievement of those who terminated their educations at the end of high school. It is possible, of course, that the college educated performed better than the high school educated because they were more intelligent (or otherwise systematically different), but when socioeconomic background and 1972 test performance were controlled, it is still true that those who received some education beyond high school did better on both the verbal and mathematics tests than did the group with high school educations.

It was also our expectation that students who attended post-secondary schools would receive higher achievement scores in 1979 than in 1972. This was true for the verbal portion of the achievement test. Even when socioeconomic background and 1972 test performance were controlled, whites increased their verbal test performance between 1972 and 1979. For the mathematics subtest, however, there was a general deterioration of performance between high school graduation and 1979. We expect that the mathematics test required skills that may not have been used for some time. That is, once out of high school the students (for all practical purposes regardless of their post-secondary educational attainment) forgot many of the mathematical skills they once possessed in high school.

Blacks.

In general the same pattern was found for the tests for blacks as for whites, although all mean scores for blacks were considerably lower than for whites with the same type of education. The higher the score on the 1972 tests, the more likely were blacks to obtain different kinds of post-secondary education. Blacks also improved their test performance in 1979 on the verbal test, and like whites, did less well or about the same on the mathematics test.

In comparing adjusted means for groups obtaining some post-secondary education with the group with a high school education only, a significant difference was found only for black four-year college graduates, on both the verbal and mathematics test. In the case of adjusted means for mathematics scores, the nonsignificant differences

appear to be a result of the smaller sample sizes for the black groups since the magnitudes of differences for blacks was about the same as for whites. For vocabulary scores the magnitudes of differences were larger, although not markedly so, for whites than for blacks, indicating that nonsignificance in the case of blacks was not entirely a function of sample size. Therefore, it appears that blacks from two-year colleges did not perform better on the 1979 vocabulary test than blacks with no education beyond high school who had similar backgrounds and 1972 ability, but blacks from two-year colleges did perform better on the 1979 mathematics test.

DISCUSSION.

It should be noted that the tests used in this study were relatively short, 15 items for the vocabulary test and 25 for the mathematics test. Longer, more comprehensive tests, which could better determine depth of knowledge, would be likely to produce scores that would better discriminate among the groups. Therefore, we do not wish to focus on the magnitude of the differences between group means, but rather on the pattern which evolved.

Previous studies (see Bowen, 1977; Pace, 1979), which reported that four-year college attendance improves verbal skills, were supported by this study. In addition, we have found that attendance at two-year colleges appears also to improve verbal skills. Whites in both vocational and academic programs have significantly higher scores than whites with the same background and initial ability who completed their educations at the high school level. Blacks who graduated from two-year college

programs, however, appear not to improve their verbal skills to a greater extent than blacks of similar background who graduated from high school only. This conclusion is very tentative, however, because the sample size of black two-year college graduates was so small.

Our findings with regard to performance on the mathematics test suggest that mathematics competence declines or remains the same over a seven-year period, regardless of the amount and type of education that one obtains. Previous research on four-year colleges (see Bowen, 1977; Pace, 1979) indicates that gains in mathematical competence are a function of the number of mathematics courses taken. Many college attenders take only one or two required math courses. In general, those who attended two-year or four-year colleges maintained their level of mathematical competence while those not attending college did not. For both whites and blacks, those 1972 high school graduates who received post-secondary educations had higher mathematical achievement scores than those subjects who had only a high school education.

Our findings suggest that two-year colleges are contributing to the cognitive development of their students, although benefits to black students are less in evidence than the benefits to white students. Additional research using more comprehensive measuring instruments and larger samples of community college graduates, especially blacks, are needed. The retesting of high school graduates after they have completed their educations is rare, but important to assessing the contribution of higher education to cognitive development. We have used some unique data to shed some light on the effects of community colleges in promoting the cognitive development of their students.

Table 1

Means (and Standard Deviations) for
Verbal and Mathematics Tests:
1972, 1979 and 1979 Adjusted for Covariates
(Whites)

Verbal (15 items)	1972	1979	1979 Adjusted
High School Only (N=431)	4.954 (3.437)	7.028 (4.013)	8.26
Non-College Vocational (N=338)	6.141 (3.622)	8.669 (3.918)	9.09 *
Two Year College Vocational (N=45)	6.806 (3.496)	9.608 (3.764)	9.55 *
Two Year College Academic (N=75)	7.880 (3.394)	10.693 (3.065)	9.94 *
Four Year College (N=384)	9.074 (3.571)	11.989 (2.980)	10.41 *
Mathematics (25 items)			
High School Only (N=431)	9.250 (6.399)	7.427 (5.748)	10.42
Non-College Vocational (N=338)	12.452 (6.182)	10.622 (6.628)	11.29 *
Two Year College Vocational (N=45)	14.911 (5.911)	13.081 (6.710)	11.99 *
Two Year Coilege Academic (N=75)	14.761 (5.898)	14.053 (6.428)	13.04 *
Four Year College (N=384)	18.350 (5.333)	17.432 (5.700)	13.08 *

* Indicates significantly different at α =.05 from mean of group with High School Only.

Table 2

Means (and Standard Deviations) for
Verbal and Mathematics Tests:
1972, 1979 and 1979 Adjusted for Covariates
(Blacks)

Verbal (15 items)	1972	1979	1979 Adjusted
High School Only (N=115)	1.591 (2.808)	3.654 (3.833)	4.85
Non-College Vocational (N=113)	2.717 (2.564)	4.013 (3.863)	4.31
Two Year College Vocational or Academic (N=24)	3.375 (3.430)	4.437 (3.817)	4.01
Four Year College (N=75)	5.830 (3.562)	9.100 (3.680)	6.93 *
Mathematics (25 items)			
High School Only (N=115)	3.594 (3.917)	2.704 (4.182)	4.56
Non-College Vocational (N=113)	5.803 (4.898)	5.248 (5.380)	5.62
Two Year College Vocational or Academic (N=24)	4.847 (4.566)	5.236 (4.576)	6.11
Four Year College (N=75)	11.903 (6.162)	11.213 (6.576)	7.53 *

* Indicates significantly different at $\alpha = .05$ from mean of group with High School Only.

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